AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): A self-doping type electrically conducting polymer comprising crosslinked polymer chains, wherein the crosslinking is formed through a sulfone bond and the polymer contains an isothiahaphthene skeleton having a sulfonic acid group.

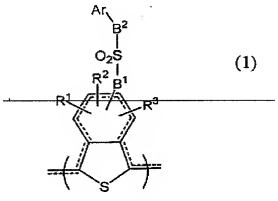
2. (canceled).

3. (currently amended): The self-doping type electrically conducting polymer as claimed in claim 1, wherein ~~the crosslinking is formed through a sulfone bond and~~ the sulfone bond is contained in an amount of from 1 to 90 mol% based on the repeating unit of the polymer.

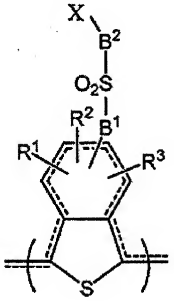
4. (previously presented): The self-doping type electrically conducting polymer as claimed in claim 1, wherein the polymer chains are crosslinked through a bond having a binding energy from 0.5 to 2 eV lower than the binding energy of the sulfonic acid group as measured by X-ray photoelectron spectrometry.

5. (canceled).

6. (currently amended): The self-doping type electrically conducting polymer as claimed in ~~claim 5~~ claim 1, wherein the crosslinked structure through a sulfone bond is a isothianaphthene structure represented by ~~formula (1)~~formula (1)'



(1)

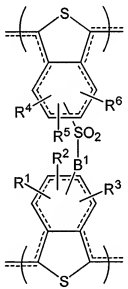


(1)'

wherein R^1 to R^3 each independently represents a hydrogen atom, a linear or branched alkyl group having from 1 to 20 carbon atoms, a linear or branched alkoxy group having from 1 to 20 carbon atoms, a linear or branched alkenyl group having from 2 to 20 carbon atoms, a linear or branched alkenyloxy group having from 2 to 20 carbon atoms, a hydroxyl group, a halogen atom, a nitro group, a cyano group, a trihalomethyl group, a phenyl group, a substituted phenyl group or a $-B^1-SO_3^-M^+$ group, B^1 and B^2 each independently represents $-(CH_2)_p-(O)_q-(CH_2)_r-$, p

and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, ~~X~~Ar~~-~~ represents a polymer chain selected from a polypyrrole structure, a polythiophene structure, a polycarbazole structure, a polyaniline structure and an arylenevinylene structure which bonds to B^2 via an aromatic ring or a heterocyclic ring contained in the polymer chain~~a monovalent aromatic group, a substituted monovalent aromatic group, a monovalent heterocyclic group or a substituted monovalent heterocyclic group~~, and M^+ represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

7. (withdrawn-currently amended): The self-doping type electrically conducting polymer as claimed in ~~claim 6~~ claim 1, wherein the crosslinked structure through a sulfone bond is a structure represented by formula (2):

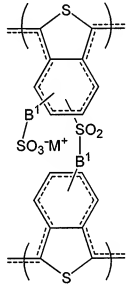


(2)

wherein R^1 to R^6 each independently represents a hydrogen atom, a linear or branched alkyl group having from 1 to 20 carbon atoms, a linear or branched alkoxy group having from 1 to 20 carbon atoms, a linear or branched alkenyl group having from 2 to 20 carbon atoms, a linear or branched alkenyloxy group having from 2 to 20 carbon atoms, a hydroxyl group, a halogen atom, a nitro group, a cyano group, a trihalomethyl group, a phenyl group, a substituted phenyl group

or a $-B^1-SO_3^-M^+$ group, B^1 represents $-(CH_2)_p-(O)_q-(CH_2)_r-$, p and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, and M^+ represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

8. (withdrawn): The self-doping type electrically conducting polymer as claimed in claim 7, wherein the crosslinked structure through a sulfone bond is a structure represented by formula (3)

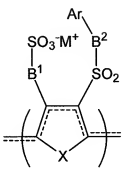


(3)

wherein B^1 represents $-(CH_2)_p-(O)_q-(CH_2)_r-$, p and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, and M^+ represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

9. (canceled).

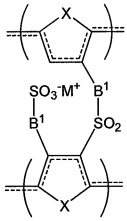
10. (withdrawn-currently amended): The self-doping type electrically conducting polymer as claimed in ~~claim 9~~ claim 1, wherein the crosslinked structure through a sulfone bond contains a structure represented by formula (4)



(4)

wherein X represents -S-, -O- or -N (-R^{15})-, R^{15} represents a hydrogen atom, a linear or branched alkyl group having from 1 to 20 carbon atoms, or a linear or branched alkenyl group having from 2 to 20 carbon atoms, B^1 and B^2 each independently represents - $(CH_2)_p$-$(O)_q$-$(CH_2)_r$-, p and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, Ar represents a monovalent aromatic group, a substituted monovalent aromatic group, a monovalent heterocyclic group or a substituted monovalent heterocyclic group, and M^+ represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

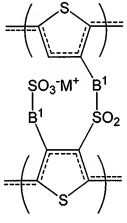
11. (withdrawn): The self-doping type electrically conducting polymer as claimed in claim 10, wherein the crosslinked structure through a sulfone bond is a structure represented by formula (5)



(5)

wherein X represents -S-, -O- or -N (-R^{15}) -, R^{15} represents a hydrogen atom, a linear or branched alkyl group having from 1 to 20 carbon atoms, or a linear or branched alkenyl group having from 2 to 20 carbon atoms, B^1 represents - $(CH_2)_p$- (O) $_q$-$(CH_2)_r$-, p and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, and M^+ represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

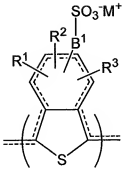
12. (withdrawn): The self-doping type electrically conducting polymer as claimed in claim 11, wherein the crosslinked structure through a sulfone bond is a structure represented by formula (6)



(6)

wherein B^1 represents - $(CH_2)_p$ - (O) $_q$- $(CH_2)_r$-, p and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, and M^+ represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

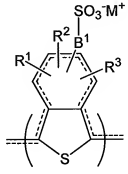
13. (original): A process for producing the self-doping type electrically conducting polymer containing a crosslinked structure through a sulfone bond represented by formula (2) described in claim 7, comprising dehydration-condensing self-doping type electrically conducting polymers having a structure represented by formula (7)



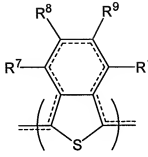
(7)

wherein R^1 to R^3 each independently represents a hydrogen atom, a linear or branched alkyl group having from 1 to 20 carbon atoms, a linear or branched alkoxy group having from 1 to 20 carbon atoms, a linear or branched alkenyl group having from 2 to 20 carbon atoms, a linear or branched alkenyloxy group having from 2 to 20 carbon atoms, a hydroxyl group, a halogen atom, a nitro group, a cyano group, a trihalomethyl group, a phenyl group, a substituted phenyl group or a $-B^1-SO_3^-M^+$ group, with the proviso that at least one of R^1 to R^3 is a hydrogen atom, B^1 represents $-(CH_2)_p-(O)_q-(CH_2)_r-$, p and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, and M^+ represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

14. (original): A process for producing the self-doping type electrically conducting polymer containing a crosslinked structure through a sulfone bond represented by formula (2) described in claim 7, comprising dehydration-condensing self-doping type electrically conducting polymers having a structure represented by formula (7) and/or formula (8):



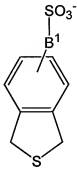
(7)



(8)

wherein R^1 to R^3 and R^7 to R^{10} each independently represents a hydrogen atom, a linear or branched alkyl group having from 1 to 20 carbon atoms, a linear or branched alkoxy group having from 1 to 20 carbon atoms, a linear or branched alkenyl group having from 2 to 20 carbon atoms, a linear or branched alkenyloxy group having from 2 to 20 carbon atoms, a hydroxyl group, a halogen atom, a nitro group, a cyano group, a trihalomethyl group, a phenyl group, a substituted phenyl group or a $-B^1-SO_3^-M^+$ group, with the proviso that at least one of R^7 to R^{10} is a hydrogen atom, B^1 represents $-(CH_2)_p-(O)_q-(CH_2)_r-$, p and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, and M^+ represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

15. (withdrawn): A process for producing the self-doping type electrically conducting polymer containing a crosslinked structure through a sulfone bond represented by formula (3) described in claim 8, comprising dehydration-condensing self-doping type electrically conducting polymers obtained by (co)polymerizing a monomer represented by formula (9):

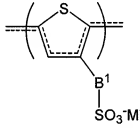


(9)

wherein B^1 represents - $(CH_2)_p$ - $(O)_q$- $(CH_2)_r$-, p and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, and M^+ represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

16. (previously presented): The process for producing a self-doping type electrically conducting polymer as claimed in claim 13, wherein the dehydration condensation reaction is performed by a heat treatment at a temperature range of 210 to 350°C.

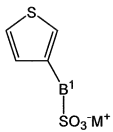
17. (withdrawn): A process for producing the self-doping type electrically conducting polymer containing a crosslinked structure through a sulfone bond represented by formula (6) described in claim 12, the process comprising dehydration-condensing self-doping type electrically conducting polymers containing a structure represented by formula (10)



(10)

wherein B^1 represents -$(CH_2)_p$ - $(O)_q$- $(CH_2)_r$-, p and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, and M^+ represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

18. (withdrawn): A process for producing the self-doping type electrically conducting polymer containing a crosslinked structure through a sulfone bond represented by formula (6) described in claim 12, comprising dehydration-condensing self-doping type electrically conducting polymers obtained by (co)polymerizing a monomer represented by formula (11)



(11)

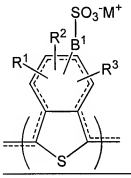
wherein B^1 represents - $(CH_2)_p$ - $(O)_q$- $(CH_2)_r$-, p and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, and M^+ represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

19. (previously presented): A self-doping type electrically conducting polymer obtained by the production process described in claim 13.

20. (previously presented): An electrically conducting composition comprising the self-doping type electrically conducting polymer described in claim 1, and a solvent.

21. (original): A method for producing an electrically conducting film, comprising coating the electrically conducting composition described in claim 20 on a substrate and heating it.

22. (currently amended): The method for producing an electrically conducting film as claimed in claim 21, wherein the self-doping type electrically conducting polymer having a structure represented by formula (7) and/or formula (8) ~~described in claim 14~~ is applied onto a substrate surface and then the substrate is heated at a temperature of 210 to 350°C for 1 to 600 seconds.



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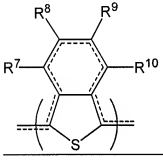

(8)

wherein R^1 to R^3 and R^7 to R^{10} each independently represents a hydrogen atom, a linear or branched alkyl group having from 1 to 20 carbon atoms, a linear or branched alkoxy group having from 1 to 20 carbon atoms, a linear or branched alkenyl group having from 2 to 20 carbon atoms, a linear or branched alkenyloxy group having from 2 to 20 carbon atoms, a hydroxyl group, a halogen atom, a nitro group, a cyano group, a trihalomethyl group, a phenyl group, a substituted phenyl group or a $-B^1-SO_3^-M^+$ group, with the proviso that at least one of R^7 to R^{10} is a hydrogen atom, B^1 represents $-(CH_2)_p-(O)_q-(CH_2)_r-$, p and r each independently represents 0 or an integer of 1 to 3, q represents 0 or 1, and M^+ represents a hydrogen ion, an alkali metal ion or a quaternary ammonium ion.

23. (withdrawn): The method for producing an electrically conducting film as claimed in claim 21, wherein the self-doping type electrically conducting polymer having a structure represented by formula (10) described in claim 17 is applied onto a substrate surface and then the substrate is heated at a temperature of 120 to 250°C for 1 to 600 seconds.

24. (previously presented): An electrically conducting film produced by the method described in claim 21.

25. (original): The electrically conducting film as described in claim 24, wherein the film thickness is from 1 to 1,000 nm.

26. (previously presented): A coated product comprising a shaped body having coated on the surface thereof the self-doping type electrically conducting polymer described in claim 1.

27. (previously presented): A coated product comprising a substrate as a shaped body, wherein one surface, both surfaces or the entire surface of the substrate is coated with the self-doping type electrically conducting polymer described in claim 1.

28. (original): A coated product comprising a substrate as a shaped body, wherein one surface, both surfaces or the entire surface of the substrate is coated with the electrically conducting composition described in claim 20.

29. (previously presented): The coated product as claimed in claim 27, wherein the substrate is a silicon wafer.

30. (previously presented): The coated product as claimed in claim 27, wherein the substrate is entirely or partially coated with indium tin oxide.

31. (previously presented): An electronic device comprising the self-doping type electrically conducting polymer described in claim 1.

32. (original): An electronic device comprising the electrically conducting composition described in claim 20.

33. (previously presented): An organic light-emitting element comprising at least one light-emitting layer between a pair of anode and cathode, wherein the self-doping type electrically conducting polymer described in claim 1 is contained in the anode buffer layer.

34. (original): The organic light-emitting element as claimed in claim 33, wherein the self-doping type electrically conducting polymer has a sulfonic acid group.

35. (previously presented): The organic light-emitting element as claimed in claim 33, wherein the self-doping type electrically conducting polymers are crosslinked through a sulfone bond.

36. (previously presented): An organic light-emitting element comprising the self-doping type electrically conducting polymer described in claim 1.

37. (original): An organic light-emitting element comprising the electrically conducting composition described in claim 20.

38. (original): The organic light-emitting element as claimed in claim 33, wherein the light-emitting layer comprises a fluorescence-emitting polymer material.

39. (original): The organic light-emitting element as claimed in 33, wherein the light-emitting layer comprises a phosphorescence-emitting polymer material.

40. (previously presented): An organic EL display comprising the organic light-emitting element described in claim 33.

41. (original): A display device for portable terminals, comprising the organic EL display described in claim 40.

42. (new): The self-doping type electrically conducting polymer as claimed in claim 1, wherein one of the crosslinked polymer chains contains an isothianaphthene skeleton having a sulfonic acid group and another of the crosslinked polymer chains is selected from the group consisting of a polypyrrole structure, a polythiophene structure, a polycarbazole structure, a polyaniline structure and an arylenevinylene structure.